

PLANNING FOR LOCAL AGENCY TRANSPORTATION ASSET MANAGEMENT

An Analysis of Knowledge and Resource Shortcomings within Local Georgia Agencies



Source: Georgia Transportation Services Regional Directory

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I am pleased to have been a part of this research project with the mission to equip local Georgia governments with the tools needed to lead effective and efficient management systems and improve the lives of the millions of Georgia residents. This report presents the combined results of my contribution to the research project’s mission to encourage a more systematic approach to managing transportation infrastructure at the local level.

I would like to thank both Dr. Zhaohua Wang and my teammate, Mr. Ryan Salameh, a PhD Student at Georgia Tech, for their research contributions. Ryan played a critical role in researching the performance measures, asset inventory, data management, and the conditions assessment portions of our project’s final guidelines for local agencies.

ABSTRACT

Many local cities and counties lack the tools, resources, guidance, and funding necessary to effectively and efficiently manage transportation assets. Local Governments (LGs) in the United States are currently managing the majority of Georgia's roadway miles, bridges, and other critical transportation infrastructure (1). As population growth, demographic shifts, and other changes occur throughout Georgia, there is an increasing need to build and preserve transportation infrastructure that will support new growth and demand. This research analyzes the systematic approaches that local Georgia agencies use to manage transportation infrastructure. The following research includes a literature review that explores current transportation asset management (TAM) practices at federal, state, and local levels. Additionally, the research integrates a survey that was conducted to gather information directly from local Georgia counties and cities. The goal of this research is to use the information gathered from the literature review and survey to identify knowledge and resource gaps relating to transportation asset management (TAM) and propose actionable recommendations for improvements to existing transportation management specifically targeted for local Georgia agencies. This research will be predominantly focused on delivering recommendations for cost-saving opportunities, efficient resource allocation techniques, and maximization of organizational structure.

INTRODUCTION

Demographic shifts and population growth are transforming cities across the county. Atlanta currently has the eighth-largest total resident population of any metropolitan area. By the year 2046, Atlanta's total resident population is projected to surpass those of Miami-Fort

Lauderdale and Washington-Arlington, becoming the fifth-largest metro area based on total resident population (2). Although these growth trends highlight growth occurring in metro Atlanta, surrounding areas will likely feel the weight of the projected growth. Georgia's transportation network is highly susceptible to the increased demand that accompanies population growth and development. A city's transportation system shapes cities in more ways than one. Transportation systems improve a city's access, mobility, and social equity; transportation has the potential to transform the way we think of cities. The need for an improved and maintained transportation network is dire.

PROBLEM

A critical issue thwarting Georgia and many other states around the country is the lack of structured guidance, resources, tools, and funding necessary to manage transportation assets effectively. This research explores the lack of resources and policy guidance for transportation management within LGs, specifically within Georgia. Georgia has 159 counties, 12 regional commissions, and 580 incorporated municipalities consisting of cities, towns, and consolidated cities and city-counties (3). Each of these jurisdictions vary in geographical size, population, resources, and number of managed assets. The management of transportation assets is a complicated process when many agencies and jurisdictions are involved and there is no one-size fits all solution or recommended approach.

Federal, state, and local authorities are developing and implementing asset management as a strategic process that optimizes the performance and cost-effectiveness of transportation facilities (1). There is no standard asset management framework or policy that can serve agencies with different resources, political environments, and maturity of their management processes (4).

Counties must work to be proactive in their efforts to maintain, rehabilitate, and invest in transportation capital expenditures. The Georgia Department of Transportation (GDOT) maintains over 18,000 of Georgia's 123,456 miles of roadway and about 6,600 of Georgia's 14,700 bridges (5). LGs are responsible for maintaining the remaining 85% of roadway and 55% of bridge assets in the state of Georgia, as shown in Figure 1 **Error! Reference source not found.**

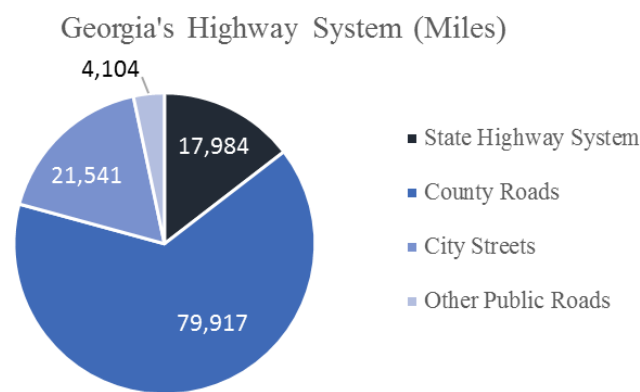


Figure 1 Distribution of Georgia's Roadway Assets Classified by Jurisdiction

DATA

The first half of this research contains data collected from a literature review on the existing TAM practices of federal, state, and other local agencies. The literature review explores the policies, funding sources, and agency structures of effective TAM programs. The literature is followed by a survey that was administered to cities and counties throughout the state of Georgia. The survey was created and distributed online using the Qualtrics survey program.

The survey contains 35 questions organized into six sections, including General Information, Transportation Asset Management Program, Condition Assessment and Data

Management, Performance Measures and Decision-Making, Funding, and Rating of Current Status. The full survey document can be found in Appendix A. This report will focus predominantly on the survey questions from the General Information, Transportation Asset Management Program, Funding, and Rating of Current Status sections.

The survey was emailed to all counties in Georgia with the assistance of GDOT. Additional outreach to cities and counties in Georgia was conducted through a random selection process. The survey encouraged individuals in managerial or directorial positions to complete the survey. Outreach consisted of emailing and follow-up calling. Fifty-six cities and counties received and began the survey. Some respondents chose not to complete the survey and several cities and counties submitted multiple survey entries. Consequently, forty survey responses were utilized for the survey analysis. Twenty-three of these responses are from counties and seventeen are from cities. The size and populations of each county and city survey respondent varied greatly. The populations of responding city agencies range from 500 to 73,800. The populations of responding county agencies range from 6,800 to 1,020,000. To ensure the maximum amount of data could be collected, survey responses were analyzed even if the respondent didn't make it to the end of the survey. If respondents answered the first set of general questions that included name, contact info, and city or county of employment, their response was kept for analysis.

The response rates for each question varied from the beginning to the end of the survey. The first question asked for the respondent's name and contact information. The response rate for this question was 100%, whereas the last question asked respondents to explain what factors are hindering their agency from adopting a proper asset management program and had a 60% response rate. Question types included a variety of single-answer multiple choice, multiple selection, short answer, sliding scales, and Likert scales. The survey utilizes branch logic, which

customizes the respondent's survey experience by allowing different question paths throughout the survey. Depending on how respondents answered certain questions, they received a slightly varied survey route.

BACKGROUND

The American Public Works Association (APWA) defines asset management as,

“a methodology to efficiently and equitably allocate resources amongst valid and competing goals and objectives” (7).

APWA is an association of all county and city public works officials. In addition to APWA, many other transportation organizations define asset management with slight variations.

AASHTO and FHWA define asset management as,

“a systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision-making. Thus, asset management provides a framework for handling both short- and long-range planning” (7).

These definitions help establish a standard basis and consistency in the understanding of asset management. Federal, state, and local agencies translate these definitions to best fit the resources and methods in place within each agency. Asset management plans should be tailored to serve the interests, financial plans, investment strategies, and available resources of each government individually.

Components of Asset Management

Figure 2 displays the steps involved in maintaining an effective and efficient asset management program. The process is cyclical and consists of a feedback loop to ensure that checks and balances maintain equilibrium within the system (1).

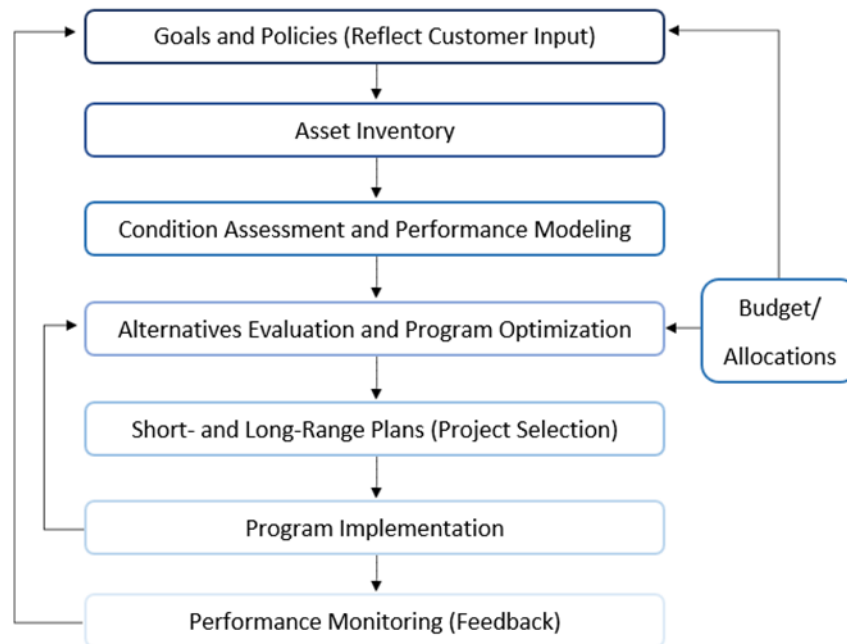


Figure 2 The Federal Highway Administration TAM Flow Chart

Figure 2 displays the asset management flowchart developed by the FHWA that serves as a framework and guide to asset management. As shown in the diagram, the critical components involved in the process of asset management are connected and form a feedback loop system.

The initial step of transportation asset management is to define the goals and policies of the system, which must state the agency's mission and reflect the customers' input and expectations. Goals must be attainable, actionable, and measurable through performance metrics (6). Agency goals and policies will guide the remaining sections of the TAMP. As the flow chart

in Figure 2 depicts, both budget and performance monitoring are factored into goals and policies. Performance monitoring is used as a check to ensure an agency's goals and policies are reflective of an agency's performance. An agency's goals and policies should be updated based on feedback gathered from performance monitoring and/or changes to the agency's budget (1).

The next step in asset management is asset inventory. APWA defines an asset as, "a physical component of a facility which has value, enables services to be provided, and has an economic life greater than twelve months" (8). The FHWA defines transportation infrastructure assets as, "the physical elements, such as pavements, bridges, culverts, signs, pavement markings, and other roadway and roadside features that comprise the whole highway infrastructure network" (8). Asset type and quantity vary at the federal, state, and local levels, as well as between local governments. An effective inventory includes infrastructure assets by type, condition, location, function, and value. This critical step in the asset management process allows agencies to maintain a cohesive, accurate, and updated log of managed assets (1). Additionally, it allows agencies to track and monitor the conditions of managed assets.

Condition assessment and performance modeling follow asset inventory. All agencies, regardless of size, must understand the existing conditions of managed assets. The frequency of conducting condition assessments may vary, depending on agency size and budget. The conditions of managed inventory must be properly assessed to determine current performance and forecast future performance. Additionally, local agencies must establish performance measures to assess current conditions. Performance measures help agencies effectively communicate their asset conditions, determine financial need, and target cost-effective solutions. Performance measures should be feasible, communicable, and measurable. Measuring systems will vary between different types of assets.

Asset inventory, conditions assessment, and performance modeling are used to evaluate different maintenance strategies and evaluate project alternatives. The next step is to plan for the changing conditions of existing assets. The main objective of the decision-making process is to understand the connection between existing conditions and project investment (1). Agencies strive to maintain a suitable level of service among all managed assets but face budgetary constraints that limit decision-making. While taking the available budget into consideration, projects are selected for short- and long-term plans.

Decision-making is followed by project and program implementation. The entire asset management program helps to ensure that projects are implemented and completed on time and on budget. Budgeting is a critical component of TAM and must be closely evaluated before other steps of the process can occur. Financial resources may be available at federal, state, and local levels for transportation asset management. This report will explore funding opportunities for local agencies.

The final step in the FHWA's asset management flow diagram is performance monitoring, which loops back to the first step in the process, goal and policy setting. Performance monitoring ensures a feedback loop that continually improves an agency's TAMP. Performance monitoring includes regular reporting to keep the public and stakeholders engaged and informed in the asset management process. Additionally, performance monitoring ensures accountability and communication within the agency. Regular meetings and discussion-based workshops encourage collaboration during the performance monitoring stage (1).

The successes at the federal and state levels have led to an increased interest in local agencies pursuing similar methods of asset management. Early local agencies that adopted asset management plans exhibit an increase in infrastructure maintenance and conditions, as well as

increased funding. However, many documents and guides related to TAM are targeted toward state agencies. Federal legislation requires state agencies to report spending, decision-making, and project construction for transportation assets, in the form of an asset management plan. Guides and framework plans accompany these legislatures, providing state agencies with the tools and guidance necessary to conduct TAM.

Georgia's Transportation History and Demand

Georgia's demand for a safe, reliable, and efficient transportation network increases daily as tourists, commuters, and residents navigate throughout all parts of the state. As the state's population increases and demographics shift, proactive measures must be taken to preserve, maintain, and improve the state's transportation network. The transportation in Georgia is expansive and involves many different entities. GDOT is responsible for managing state-owned assets, including pavements, bridges, culverts, guardrails, and signage across the state of Georgia. Additionally, GDOT manages federally-owned assets, including US Interstates and bridges. Furthermore, legislation requires GDOT to periodically report on the status and condition of federally-owned assets. The number of states implementing TAM has increased in recent years. Most state agencies practice some aspects of TAM, such as pavement or bridge management (1).

Some agencies have more complex TAM programs that analyze, compare, and prioritize policies, programs, and projects. State agencies can benefit greatly by sharing information, experiences, failures, and successes with other state agencies. AASHTO established its first TAM Subcommittee in the early 2000s, before TAM was widespread among State agencies (9). This was a substantive contribution to statewide TAM. State representatives from all 50 states

attended the 2014 TAM conference. This conference helped to initiate and facilitate state-to-state sharing of information, concerns, and proposals for TAM procedures. The Moving Ahead for Progress in the 21st Century Act (MAP-21), now the FAST Act, was established in 2012 and required state DOTs to develop risk-based TAM for pavements and bridges in the National Highway System (NHS) (9). Georgia DOT adopted and developed a TAM plan in 2012 that met Federal regulations requiring the implementation of asset management. GDOT created a TAM Steering Committee, conducted an Asset Management Self-Assessment, and administered a TAM Task Force to carry out day to day operations.

Population and Demographics

Figure 3 displays Georgia's population in 2015 and Figure 4 displays Georgia's projected population for 2019. Visible increases in population growth occur in the Northwest region of Georgia, as well as on the western edge of Metro Atlanta. Population ranges within the four most populated counties in Georgia increase significantly from 2015-2019, with the highest population increasing from 1,018,601 to 1,087,425 in Fulton County. This short time period displays significant growth in Metro Atlanta and surrounding areas.

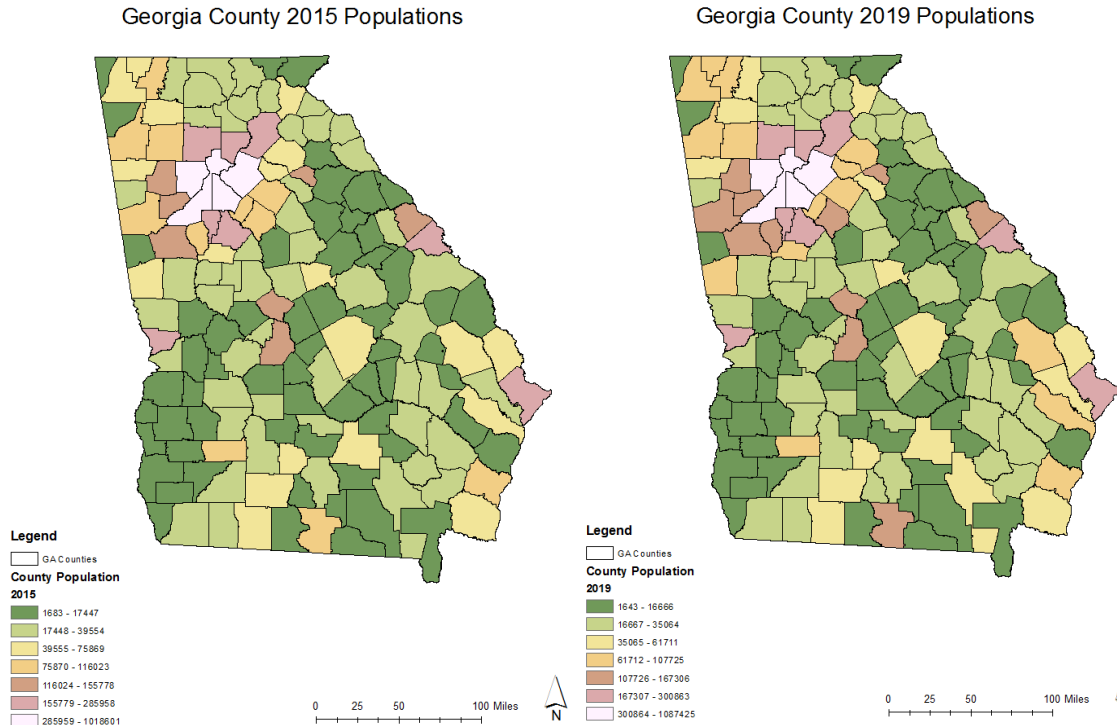
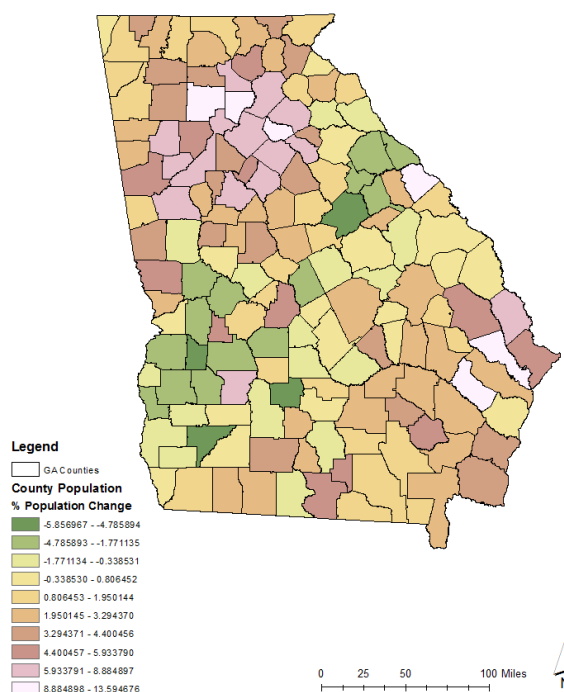


Figure 3 Georgia 2015 County Populations

Figure 4 Georgia 2019 Projected Populations

Population projections play a critical role in planning for the future conditions of Georgia. Population projects can help lend insight into where future investments should be made. Most counties are projected to experience population growth by the year 2019, with a portion of counties projected to experience negative population growth. Figure 5 shows the distribution of percent change in population from years 2015-2019.

Georgia County Percent Population Change 2015-2019

**Figure 5 Percent Population Change 2015-2019**

Local Agency TAM Case Studies

Many other LGs around the country are beginning to establish and implement TAM programs within their agencies. The state of Michigan has been at the forefront of supporting LGs in their pursuits to establish TAM programs. Ionia, Michigan implemented a multi-asset transportation management system in the early 2000s that manages streets, water, sewer lines, and fire hydrants (6). The TAM program was implemented after the city identified its problem with the inefficiencies of data collection and storage. The city then decided to transfer all data into a Geographic Information System (GIS) and enhance information access to all departments and divisions within the agency. Education and training led to the successful TAM program in Ionia. Ionia's asset management program continues to evolve as new needs present themselves.

In addition to Michigan city governments, county agencies are leading the way in TAM. Alcona County, Michigan, created a TAM program with the assistance of Michigan DOT's Local Technical Assistance Program (LTAP). Additionally, Alcona county benefits from collaboration with larger commissions and neighboring counties. Alcona employees found asset management to be an effective tool in promoting public understanding of the county's roadway asset and decision-making processes. Furthermore, this public transparency helped to enhance taxpayer support in Alcona (4).

Cole County, Missouri, is another leading example of an early LG TAM adopter. The county underwent major asset management improvements as it transitioned from an informal, knowledge-based asset management program to a more systematic approach (6). Cole County identified two main reasons for moving toward TAM practices, with the main reason being a dependence on employees' knowledge and memories to make decisions (4). The county lacked asset management processes that recorded decisions, actions, projects, and funding allocations. Asset management was established to capture information from aging and retiring employees. Additionally, the county needed to comply with the Governmental Accounting Standards Board (GASB) Statement 34. GASB Statement 34 establishes financial reporting requirements for state and local governments, including states, cities, towns, villages, and special-purpose governments such as school districts and public universities (10). GASB Statement 34 requires agencies to report the value and condition of transportation capital assets in accordance with state standards.

SURVEY ANALYSIS

The following section highlights key findings from the survey administered to Georgia counties and cities. The most noteworthy results are investigated and depicted in the following

graphs and figures. The results from the survey will be used to identify gaps and shortcomings in Georgia LG transportation asset management processes. Furthermore, the survey data highlights potential areas of improvement and opportunity.

General Information

Survey respondents began the survey with a general information section, which asked the respondents to record their name, contact information, job title, and county or city of employment. Respondents were instructed to specify whether they were from a county, city, or consolidated city-county (i.e. Macon-Bibb County). Additionally, this section included general questions about the structure and establishment of transportation infrastructure management within the respondent's agency. Figure 6 shows the distribution of city and county responses.

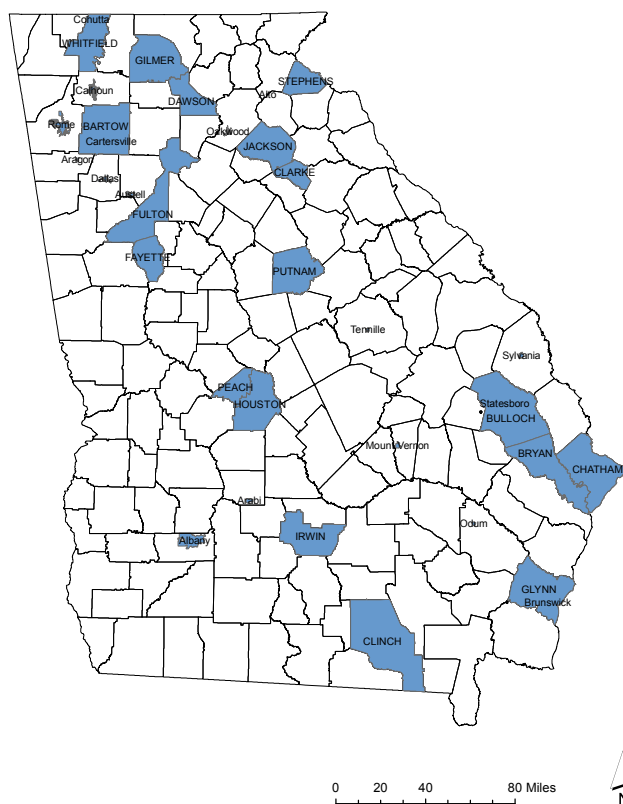


Figure 6 Distribution of Survey Responses from Georgia Counties and Cities

Each agency's transportation infrastructure management structure varied in both the number and types of involved divisions/departments, as well as the number of employees. Survey participants were asked what agencies/divisions are involved in managing transportation infrastructure assets. Public Works Department was the most frequent response, followed by Engineering and GIS departments. Additionally, most cities and counties had over twenty staffed employees actively involved in managing transportation infrastructure assets. Figure 7 below displays the number of employees involved in TAM from city and county survey respondents.

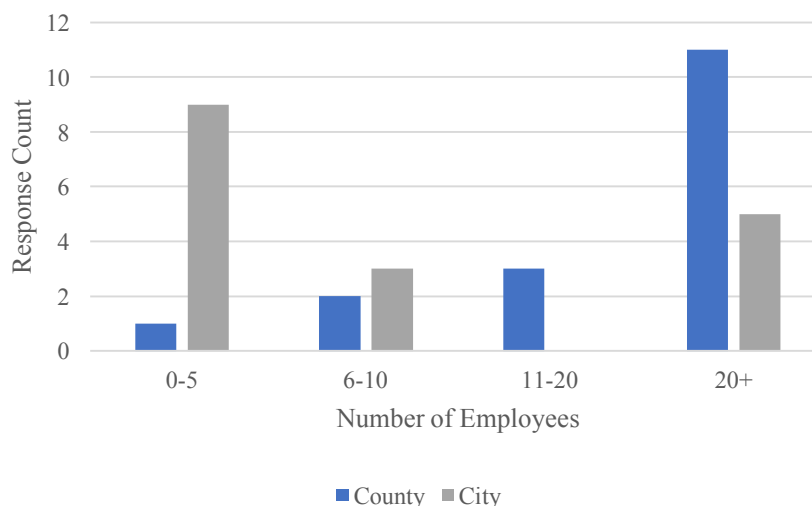


Figure 7 Number of Employees involved in TAM

The responses for this question yielded some uncertainty by respondents. In some cases, multiple employees from a single city or county completed the survey and had varying responses for this survey question. Transportation assets were not explicitly defined, so there may be some ambiguity in the question, "How many employees are involved in managing transportation infrastructure assets?" The management of transportation infrastructure may have been interpreted in several ways, which should be taken into consideration upon further analysis.

Transportation Asset Management Practices

This section of the survey covered the organization of respondents' TAM programs. This section came after the general information section and includes nine questions regarding an agency's TAM program. This section analyzes a few highlights from the survey results. The full survey question list can be found in Appendix A. The first question defines transportation asset management and asks survey participants if they practice a well-defined transportation asset management program within their agency. The answer choices are yes, no, somewhat, and not sure. The participant's response to this question dictated which questions the respondent received consequently. If respondents answered that they don't have a well-defined transportation asset management program, they automatically skip the eight remaining questions in the transportation asset management section that ask for more detail about the agency's TAM program. These respondents will continue to the next section, Condition Assessment & Data Management. The other respondents who select anything other than 'no' for the first question will work through the remaining questions in the TAM section.

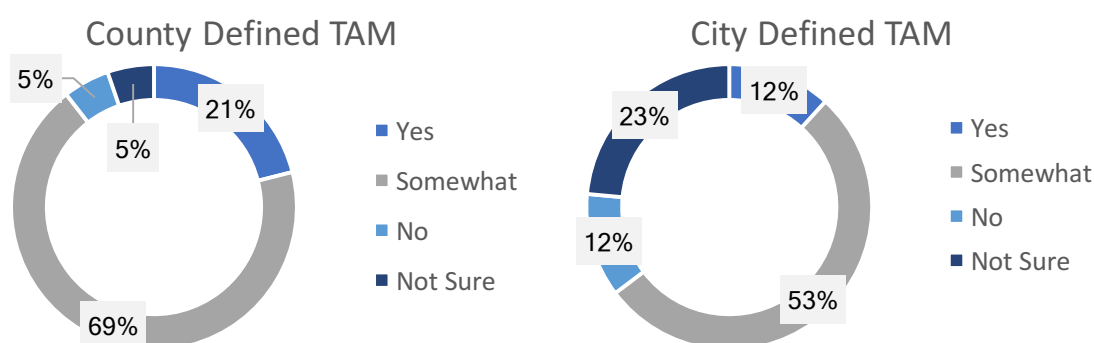


Figure 8 County Defined TAM

Figure 9 City Defined TAM

As shown in Figure 8 and Figure 9, most of city and county respondents reported having a “somewhat” defined TAM program. Many agencies have informal practices for conducting transportation management, but lack a formalized TAM process.

The survey participants who responded, “yes,” or “somewhat,” were then asked when their agency’s TAM program was established. The question gives four multiple answer choices, which are shown in Figure 8 and Figure 9. The slight majority of county agencies indicated that their TAM programs have been established for more than ten years. The most common response for city agencies was a tie between 1-5 years and more than ten years. As shown in Figure 10 and Figure 9, there is a lot of variation in the number of years an agency’s TAM was established.

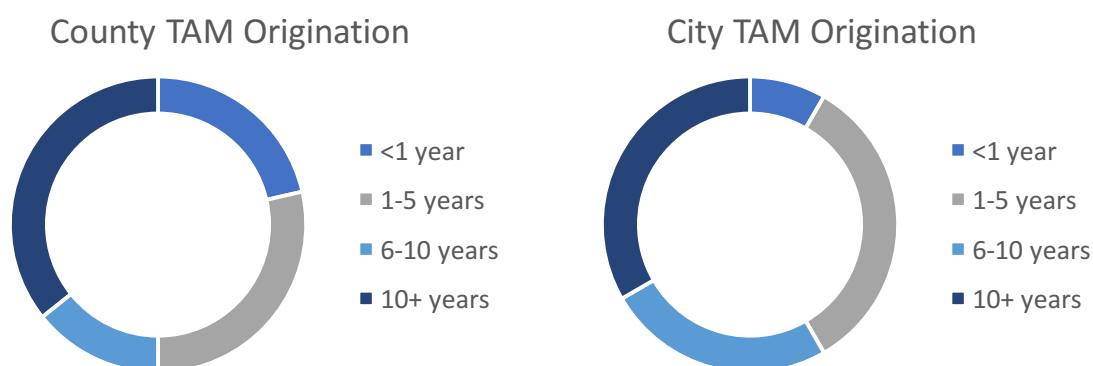


Figure 10 County TAM Origination

Figure 11 City TAM Origination

Survey participants who responded that they practice TAM within their agency, or somewhat practice TAM were asked what software their agency uses. Respondents were given a variety of different software choices, provided in multiple-response format with an additional optional write-in response. Figure 12 and Figure 13 below display the results. City agencies reported using a larger variety of software types. In both county and city agencies, GIS is the

most commonly used software in TAM. However, less than a third of city and county agencies reported using GIS in their asset management processes.

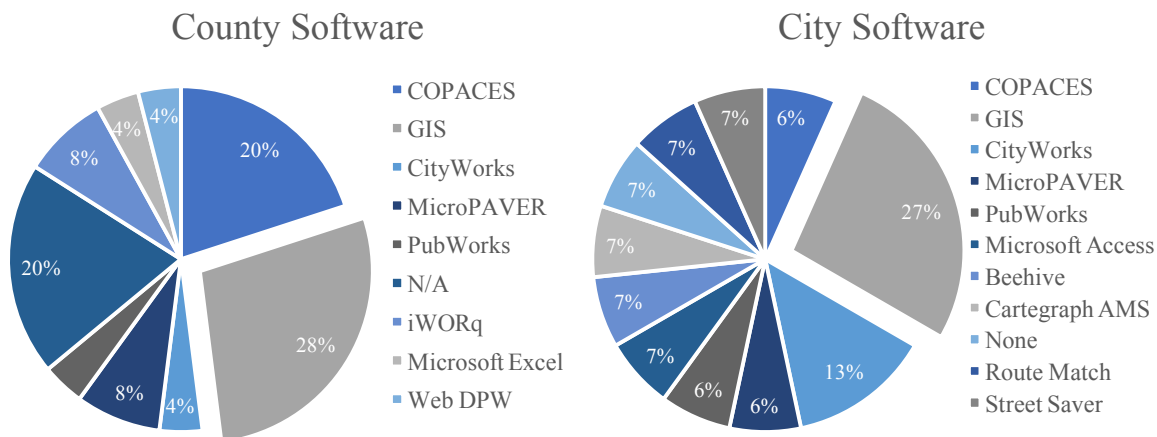


Figure 12 County Software

Figure 13 City Software

Respondents were asked if their agencies have established GIS departments or GISP employees. Respondents had answer choices yes, no, somewhat, and other: _____ (write-in option). As shown from Figure 14 and Figure 15, 67% of counties and 41% of cities have established GIS departments.

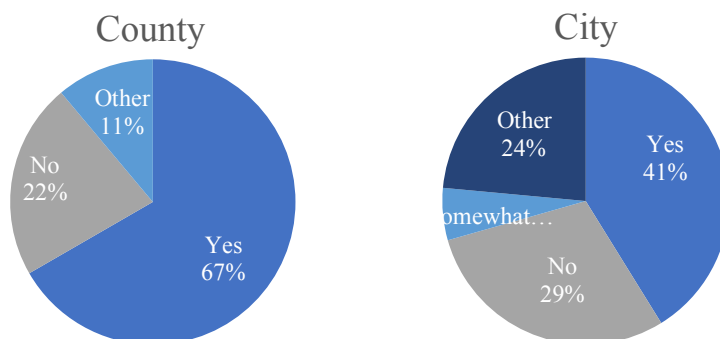


Figure 14 County Agency GIS Department

Figure 15 City Agency GIS Department

Several respondents selected other as an answer and included more information about their agency's GIS department. Some counties indicated having a contract with their regional commission to assist with GIS work. Other counties indicated that they didn't have GIS departments, but GIS duties fell on other agency divisions, such as public works. One county indicated that they hire privately for GIS services. City agencies also responded "other", indicating that they obtain GIS assistance from their county agency. One city agency noted that they have a partnership with their county, as well as several other neighboring cities.

Several county and city agencies indicated that state or federal laws/initiatives impact their agency's TAM practices. The answer choices given for this survey question included Fixing America's Surface Transportation (FAST) Act and GASB Statement 34, as well as an 'Other,' write-in option choice. Figure 16 and Figure 17 show the distribution of responses.

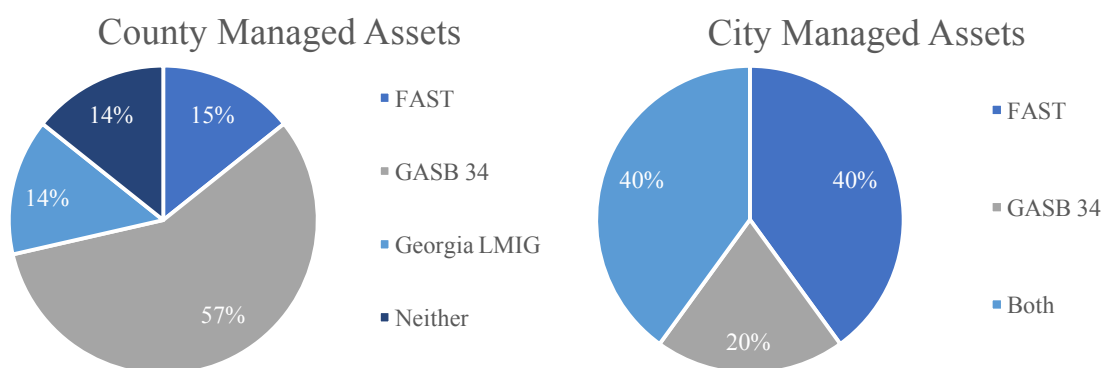


Figure 16 County Managed Assets

Figure 17 City Managed Assets

Most counties reported GASB Statement 34 impacting their agency's TAM practices. The remaining percentages were equally dispersed among FAST, Georgia LMIG, and neither.

Many city respondents reported both GASB Statement 34 and the FAST act impacting their TAM practices.

Asset Inventory and Data Management

This section of the survey was intended to explore the agencies' current practices and the tools used for the transportation asset condition assessment and data management. Most counties and cities confirmed having a well-established asset inventory, or at least some form of it. However, 50% of both counties and cities were not confident ('Somewhat', 'Not Sure') of the inventory data collection practices within their agencies, as shown in Figure 18 and Figure 19.

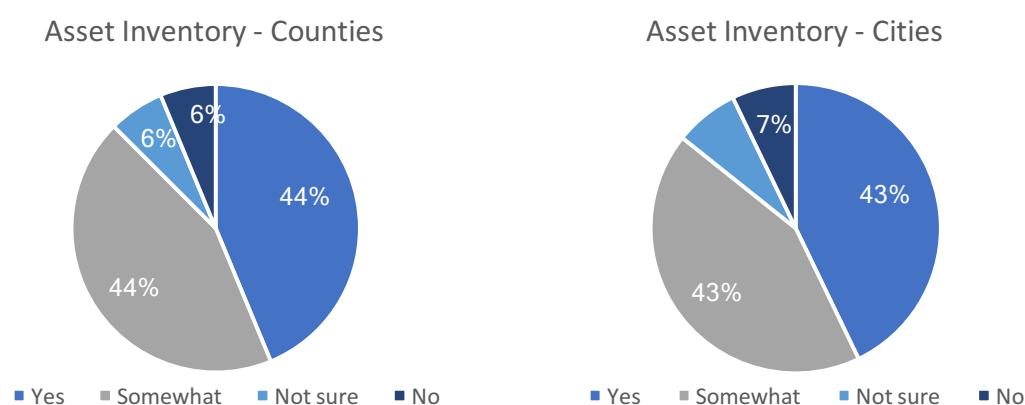


Figure 18 County Asset Inventory

Figure 19 City Asset Inventory

For responders who didn't answer 'No' to the previous question about asset inventory, they received a question about the software used for asset inventory, with the option to choose multiple answers. Figure 20 shows that paper record management systems are still widely adopted by agencies. However, GIS is the most common response from counties and

computerized databases is the most common city response. Cloud computing and mobile/web application are yet to be used in the asset management at the local level.

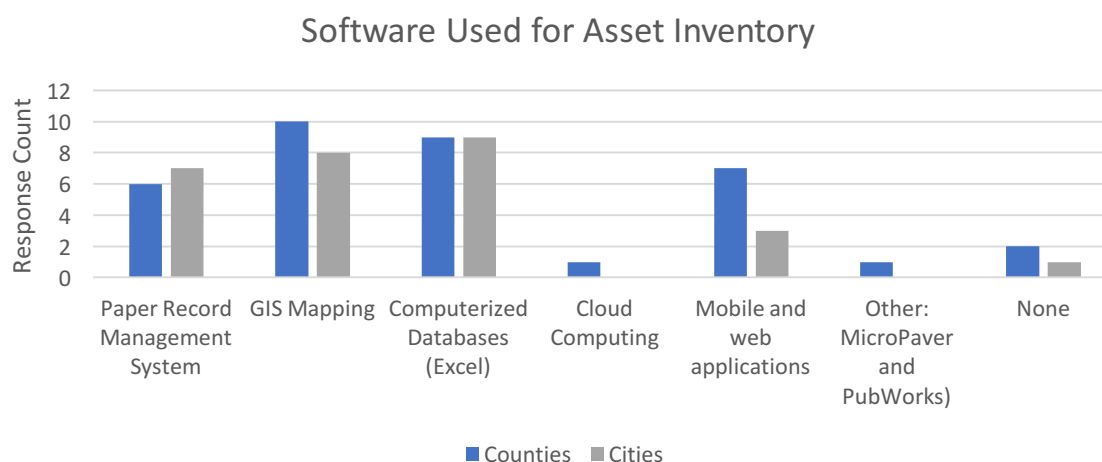


Figure 20 Software Used for Asset Inventory in Cities and Counties

Paper record management systems are extremely risky and outdated. City and county LGs are working to move away from paper record management systems and toward technologies that can improve system efficiency and reliability.

Reporting

As shown below in Figure 21 and Figure 22, most local agencies don't regularly publish reports of performance measures to the public and stakeholders. A city agency who chose the 'Other' option mentioned that monthly reports are provided to the elected officials primarily but are also open to the public, and another county agency said that they are, "working on getting this data on their webpage soon."

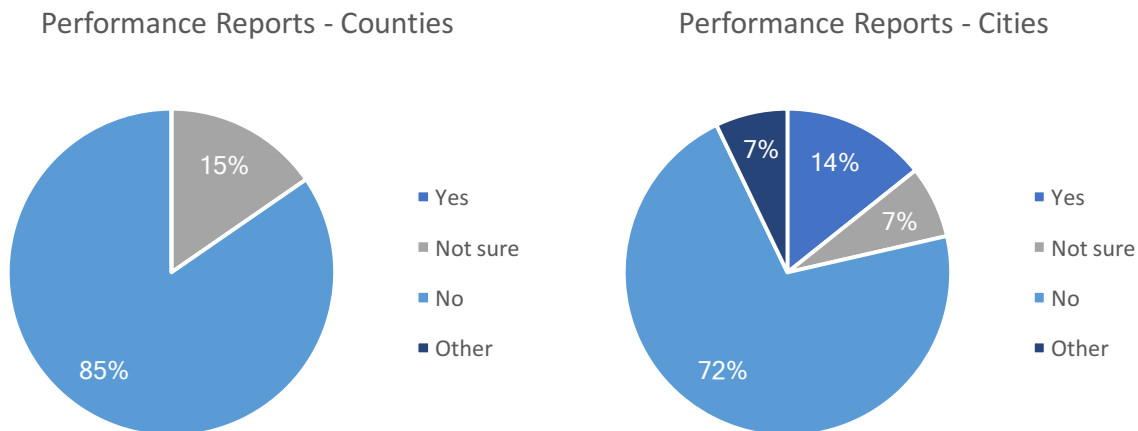


Figure 21 County Performance Reports

Figure 22 City Performance Reports

Figure 23 displays county and city responses to the survey question asking respondents to agree or disagree with the following statement, “We periodically distribute reports of performance measures for the public and stakeholders.” As shown, most counties and cities don’t practice regular reporting processes.

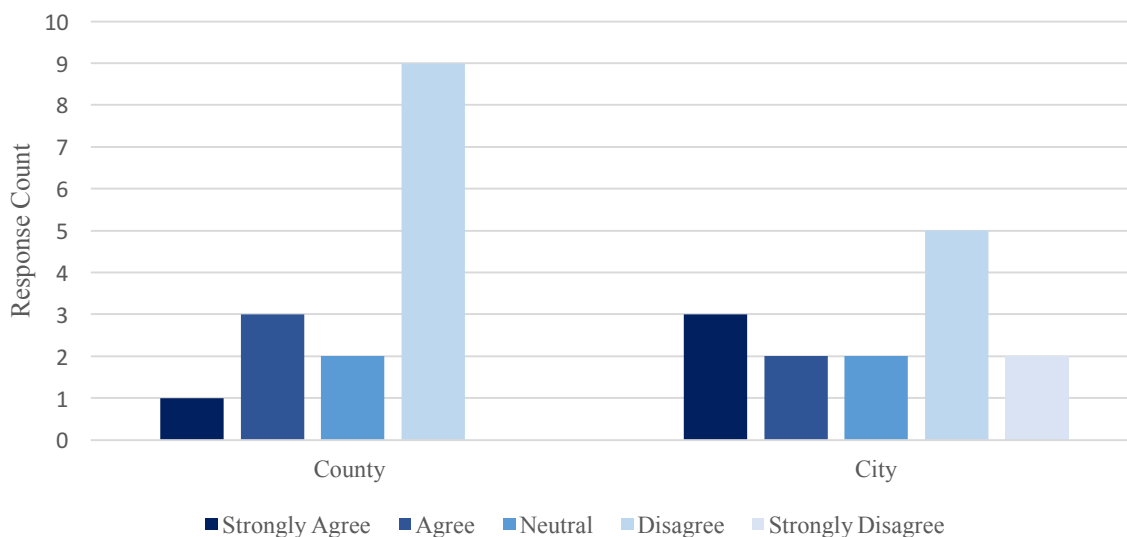


Figure 23 City and County Performance Reporting

Funding

The Funding section follows the Performance Measures and Decision-Making section and contains six questions given to all survey respondents. The first question is a four-part Likert-type question that asks respondents to record their agreement on four statements, from strongly disagree to strongly agree. Figure 24 and Figure 25 below show that the majority of county and city respondents agree to all four statements. No respondent answered, ‘Strongly Disagree,’ and very few respondents answered, ‘Disagree.’

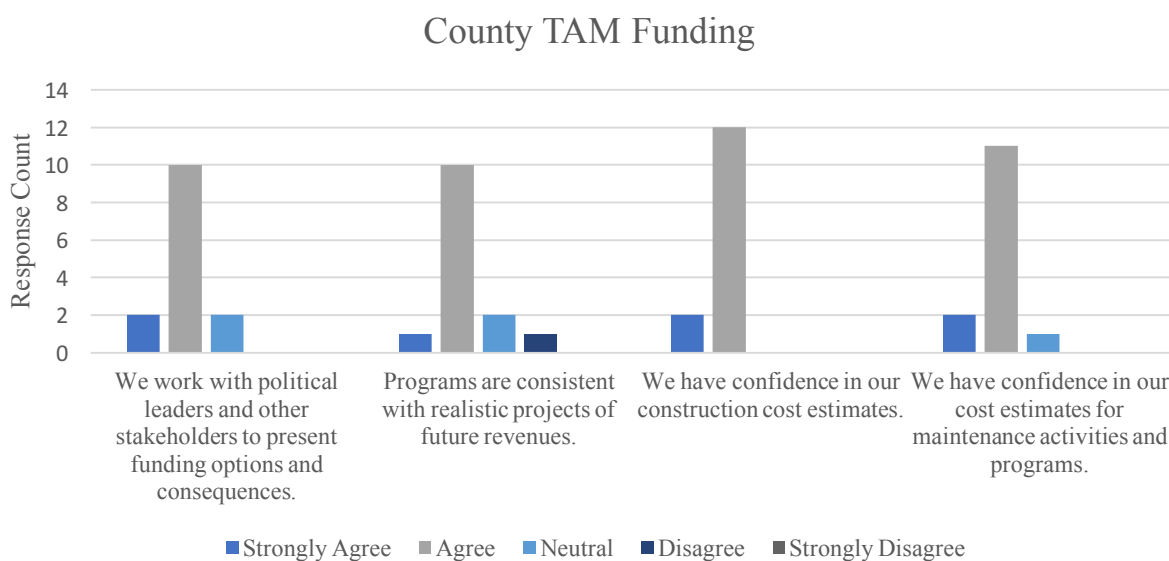


Figure 24 County TAM Funding

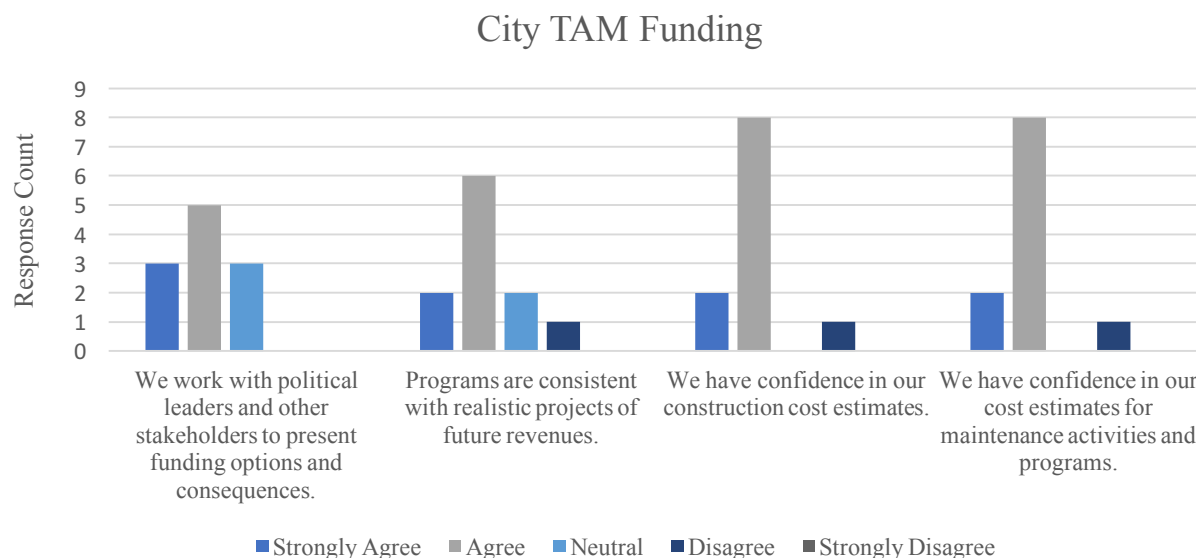


Figure 25 City TAM Funding

The final question in the funding section of the survey asks participants if they received Local Maintenance and Improvement Grant (LMIG) Funding in the past year. All respondents from county agencies that reached this question indicated that they received some amount of LMIG funding, shown in Figure 26. All but one city agency respondent reported receiving LMIG funding. The question then asked respondents to indicate the amount of funding and the local agency's cost match. All county agency respondents reported a cost match of 30%. Most respondents from city agencies reported cost matches of 30%, with one city reporting 20% and another city reporting 70%. Figure 26 below displays the range of LMIG funding awarded to local agencies.

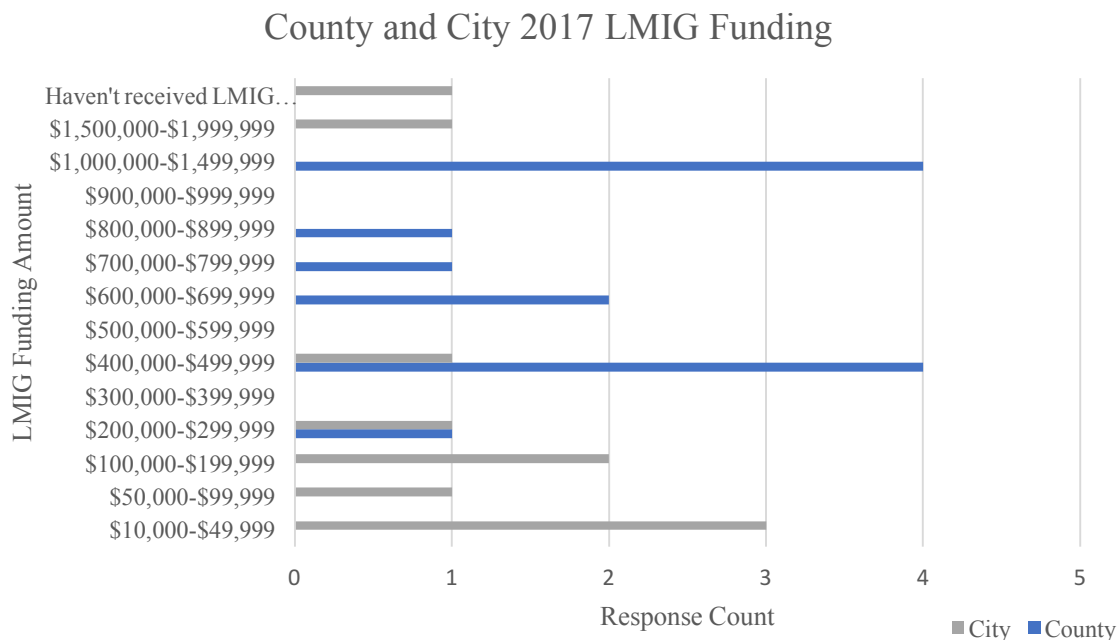


Figure 26 County and City LMIG Funding 2017

Rating of Current Status

This section of the survey included a variety of questions gauging the current management practices and resources available to LGs. Data and information sharing was addressed in the first question, shown in Figure 27 and Figure 28. The majority of city and county respondents reported having access to GDOT's agency data. The Atlanta Regional Commission was the second-most common answer for both cities and counties.

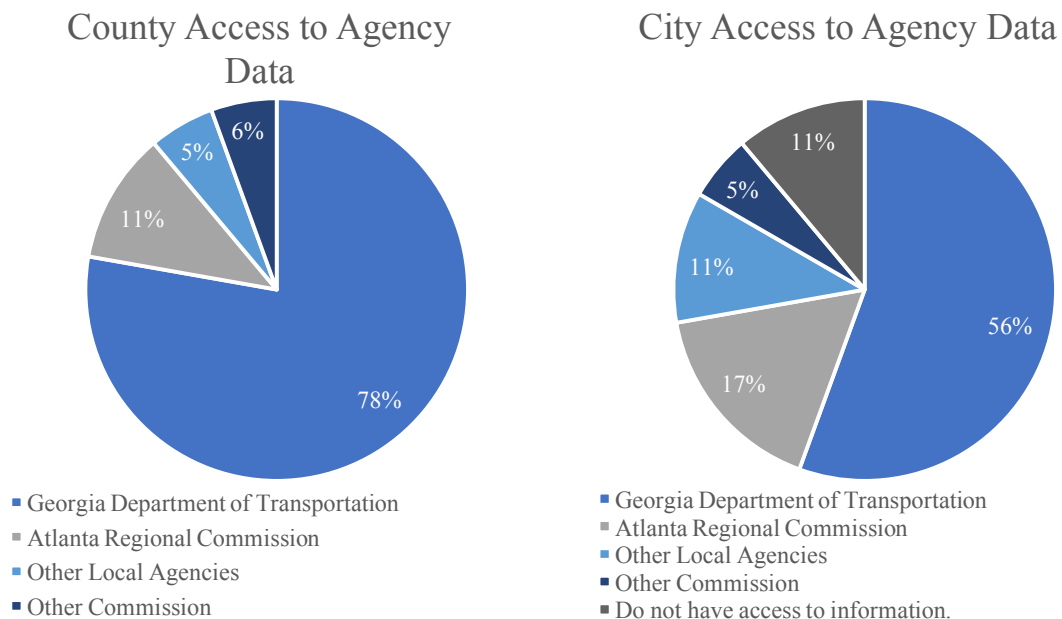


Figure 27 County Access to Agency Data

Figure 28 City Access to Agency Data

The following question asked participants' interest in five different areas, as shown in Figure 29 and Figure 30. Almost all city and county respondents reported being very interested in increased funding. Additionally, many cities and counties reported being very interested in increased support from GDOT. Agencies were very interested and somewhat interested in increased educational programming and increased collaboration with neighboring agencies.

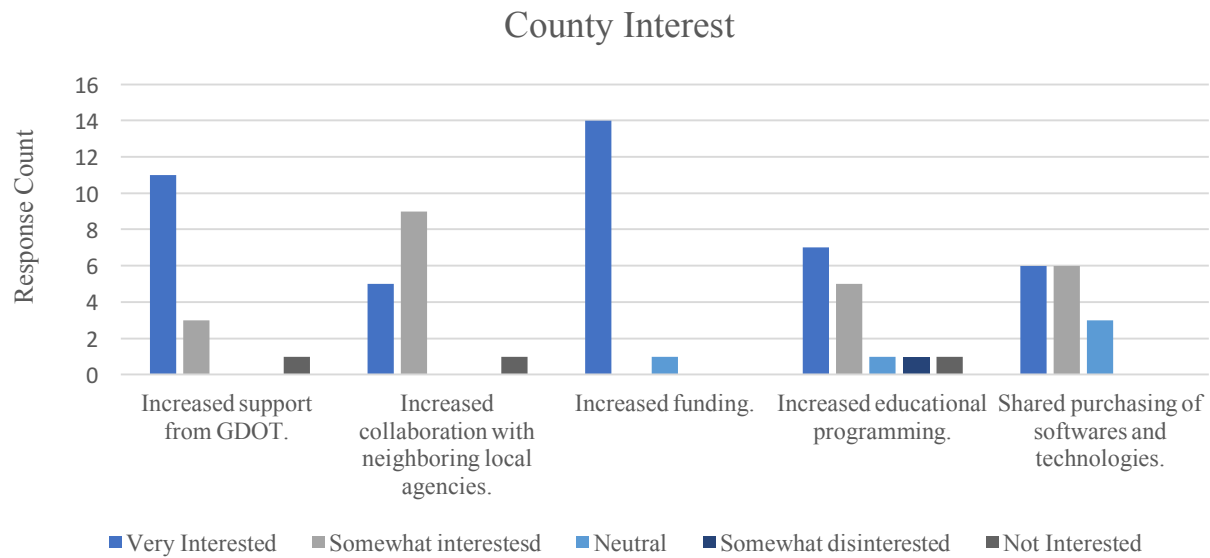


Figure 29 County Interest in TAM Components

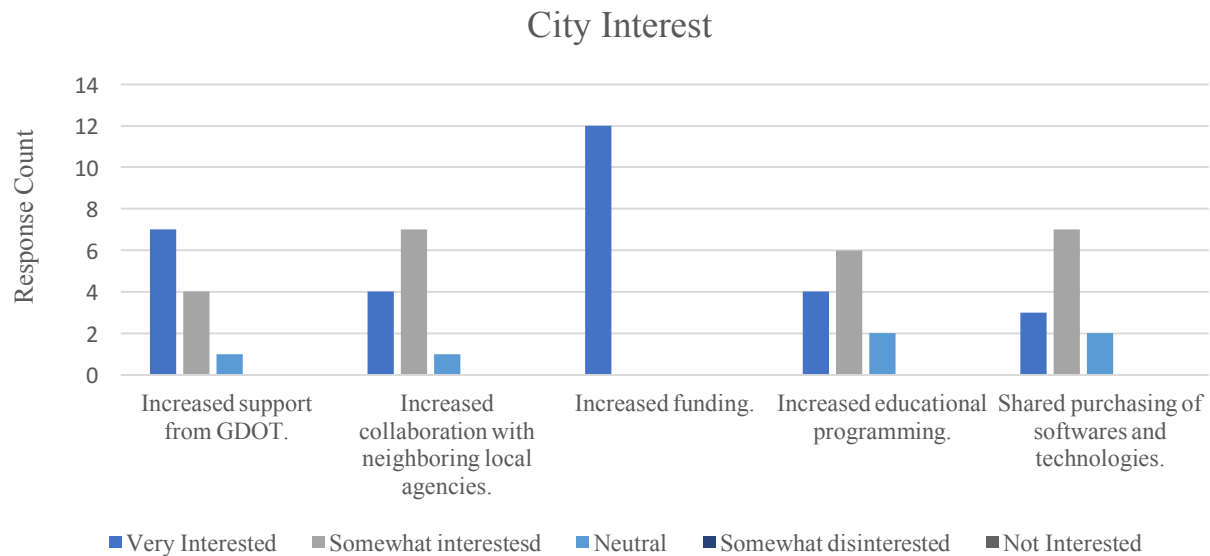


Figure 30 City Interest in TAM Components

Another question in this survey included asking participants about received LTAP aid. Fifty-three percent of counties and 50% of cities reported receiving LTAP aid in the last fiscal year. A significant number of respondents were unsure if their agency received LTAP funding,

as shown in Figure 31 and Figure 32. This may introduce some survey respondent error to the data, as the respondent might not have had all the necessary information to complete the survey.

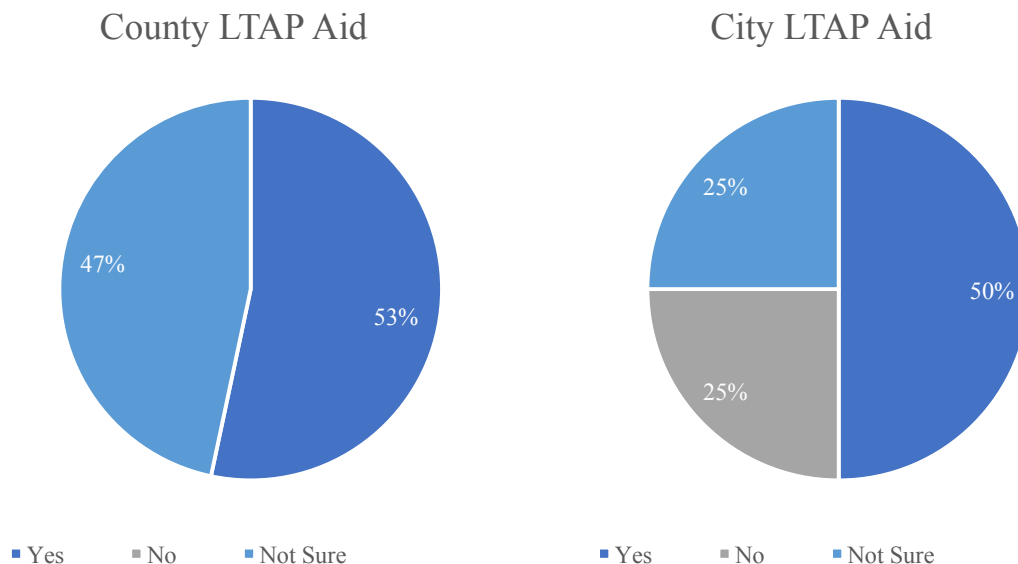


Figure 31 County LTAP Aid

Figure 32 City LTAP Aid

Respondents were given an opportunity to further explain what kind of LTAP aid was received. Table 1 below shows the responses from city and county agencies.

County Received LTAP Aid
Chain Saw Training and CoPacesCC
Classes
Funding
On-going training in many areas of Public Works
Staff went to classes offered.
Training on Sign Management, COPACES-CC, TMOST, Flagging School, and others
Training seminars
We have received regular training for our transportation workforce from LTAP. I have also received project management training from LTAP.
City Received LTAP Aid
Classroom and online training

classroom training and education
Flagging training; pavement maintenance training
Personnel training
training classes

Table 1 County and City LTAP Aid Received

FINDINGS AND RECOMMENDATIONS

This section includes areas that have been identified as relatively low-effort and low-cost measures that could significantly improve current TAM practices within local agencies. The findings and recommended measures have been developed from information gathered from the literature review and survey data.

Cost-Saving Opportunities

I. Data, Tools, and Equipment Sharing

Collaboration between agency departments, local agencies, and state departments can reduce duplicated efforts, increase resources and information, improve access to software and technologies, and reduce costs (13). Group purchasing, equipment sharing, and shared software can greatly benefit local agencies with limited resources (6). Equipment sharing is a viable option for local agencies with fewer resources than federal and state transportation departments. Initial equipment costs may be difficult for individual agencies to take on alone. Neighboring agencies often require the same materials, tools, and equipment necessary for asset management. Written contracts can be used to formalize and facilitate the sharing of equipment and materials.

A key finding from the Fifth National Workshop on Transportation Asset Management was that the sharing of data and information is a highly effective method of reducing asset management costs and improving the quality of information management (6). Data collection and storage is an essential part of asset management. Local agencies often lack the resources to create and maintain extensive databases, which is necessary for managing existing conditions.

Technological advancements are occurring rapidly around the world and TAM practices within LGs are quickly becoming outdated. New technology can be complicated and expensive to purchase and implement. These combined factors support the need for shared purchasing, equipment, and technologies. Furthermore, Figure 29 and Figure 30 reported that 80% of responding counties and 83% of cities are very interested or somewhat interested in shared purchasing of software and technologies.

II. Educational Workshops provided by GDOT (LTAP)

Education and outreach is a critical component of TAM. There are many resources for state agencies, but there is a gap in available information for local agencies. Local agencies vary greatly in size, number of resources, staff, and budget. These factors must be taken into consideration when developing a suitable TAM program for an agency. GDOT established LTAP to assist LGs in transportation management. Survey results showed that only 53% of county agencies and 50% of city agencies have utilized GDOT's LTAP. LTAP offers classroom and online training on various technologies and management techniques. Table 1 highlights some of the aid that local counties and cities have taken advantage of, including:

- Pavement Technology Software Training
- Sign Management Training

- Pavement Maintenance and Management Training

GDOT's LTAP Website highlights upcoming and ongoing educational programs, training, and seminars. It is highly recommended for LGs to utilize the resources available from GDOT.

Efficient Resource Allocation

I. Transition away from paper-based inventories and data management

Figure 20 showed that 17% of responding counties and 29% of cities rely on paper management systems. Larger evidence has shown that 20% of 70 municipal and county governments across the United States rely solely on paper data management (6).

Agencies usually adopt one or a combination of management systems such as simple paper record systems, data spreadsheets with basic or complex functions, geographic information systems (GIS) mapping, mobile and web applications, cloud computing, and other commercial software. Computerized tools streamline asset management processes for local agencies and have the capability to improve data collection, resource allocation, and decision-making. As agencies often have multiple assets to manage, data integration is an important component of the data management process. Data integration can help connect different components of an agency's transportation assets and prevent data redundancy, which is common in large agencies. Agencies are becoming increasingly attracted to the idea of data integration as a means of reducing data collection and storage costs, improving data quality and accuracy, improving data security, and improving accessibility to data. On the other hand, data interoperability improves coordination

with multiple agencies at the local, regional and federal level, and also promotes data sharing and shared learning (6).

II. Incorporate new technologies, including Microsoft Excel and ArcGIS

A Geographical Information System (GIS) department is recommended for TAMPs. GIS departments are responsible for creating and managing a standardized, accurate, and consistent information database of agency assets. Sixty-seven percent of county agencies and 41% of city agencies have established GIS departments. GIS departments can be expensive and require licensing and education. Survey respondents reported having contracts with their regional commission to assist with GIS work. This can be an affordable approach for smaller local agencies with fewer resources. Other survey respondents reported collaborating with neighboring cities or counties. Cities may rely on partner county agencies to maintain complete and consistent GIS databases. This helps to ensure consistent and compatible databases. Furthermore, neighboring agencies can share software to reduce overall costs. Additionally, some respondents indicated hiring privately for GIS assistance. This is a more expensive approach and it is recommended to explore other options before contracting out for GIS work.

Maximizing Organizational Structure

I. Nominate or elect a TAM Champion

The organizational structure and amount of available resources for local agencies vary. Therefore, the asset management processes and guidance for each local agency greatly depends on the agency's structure. Organizational culture has proven to be one of the largest obstacles in establishing an asset management program (4). Only small agencies with few employees are

exempt from this obstacle. Larger agencies with many divisions may have trouble reaching consensus when creating new system processes. Establishing a more structured and organized TAM division will greatly improve the agency's program efficiency and effectiveness.

Top management commitment is critical to the success of the TAM program. The FHWA recommends that agencies assign a senior leader within the agency to become the "champion," of the TAM program. The champion is especially influential in agencies that haven't already established TAM programs. The TAM champion will serve to initially introduce TAM techniques to the agency. Smaller agencies may have fewer resources and therefore more integration between departments. It is common that smaller agencies share roles and responsibilities between departments. Steering committees might not be feasible for smaller agencies with already stretched job roles. Instead, it may be best to clearly redefine roles for employees that more explicitly integrate the practice of TAM. In this case, a leader should be selected who will spend a majority of his or her time implementing the TAM program and guide others. TAM leaders may have the title of chief executive officer, Deputy Secretary, Director of Public Works, etc. The leader should partake in training courses and be well-informed on the practice of TAM before introducing the program to his or her agency. Although the program will be led by an individual, it is critical to educate the entire agency on the major principles of TAM.

II. Establish TAM Steering Committee

Following the nomination of a TAM champion, a TAM steering committee might be the next step for LGs. GDOT has a TAM Steering Committee that leads its asset management program. Larger agencies with multiple divisions may have trouble reaching consensus when creating new system processes. Steering committees can improve communication and

build consensus within agencies. Steering committees should consist of mostly senior managers from each agency department or division. These individuals can serve as liaisons between their departments and the TAM steering committee. The steering committee will serve to ensure that the program is working together as a unit. Larger agencies may also benefit from selecting an asset management champion to lead and guide the steering committee. TAM requires comprehensive coordination and communication among the agency's employees working under different units, therefore it is critical to get all agencies involved and understanding the importance of the TAM. Additionally, steering committees are responsible for educating the public and stakeholders on the agency's mission, vision, goals, performance measures, strategies, and progress. Agencies should focus on creating a management position or TAM office that acts as a focal point for guiding the asset management program, where information is filtered and analyzed to be directed for decision makers (10).

III. Organize regular meetings and reporting requirements

Furthermore, agencies should establish regular reporting requirements as part of their TAM programs. Effective asset management systems include accurate and frequent reporting processes. Agencies with TAM plans conduct system monitoring and performance tracking to monitor and report project schedules, costs, and quality of work. Reporting helps agencies identify potential improvement areas and ensure more accurate future project timeliness, quality, and delivery. However, reporting is often only required for State DOTs asset management programs. Federal legislature requires state agencies to follow strict reporting measures. As a result, reporting is more common within state agencies than LGs. As Figure 21 and Figure 22 displayed earlier, 85% of counties and 72% of cities don't incorporate performance reporting into their transportation management programs. However, GASB

Statement 34 requires agencies to submit financial reports regularly. Abiding by this legislature, Figure 16 and Figure 17 displayed that 57% of counties and 60% of cities are impacted by GASB Statement 34.

Additionally, agencies can set their own reporting measures to maintain accountability and progress. Reports allow the public and stakeholders to remain educated and informed on past, present, and future projects. Reporting can also be implemented within departments or divisions of local agencies. Internal reporting helps to build consensus within an agency. Agencies can hold regular meetings with involved staff to discuss project performance and execution. Reports can be scheduled as frequently as an agency prefers and should be used to the advantage of the agency. Reporting allows for a standardized record of asset management that includes cost tracking, maintenance and operations, budget, and summaries of work performed. A standardized reporting document can be created to help agencies streamline the process of reporting practices. Reports should include the following items (14):

- Predicted conditions of assets
- Final conditions of assets
- Predicted budget
- Actual budget
- Funding allocations
- Project over budget/under budget
- Project timeline
- Unanticipated costs
- Updated project prioritization list

Additionally, agencies can opt to include anticipated future projects and expenditures, multi-year progress and projects, as well as reevaluations of project goals and targets. This feedback cycle is critical to the continual improvement to an agency's TAM program.

CONCLUSION

The findings from this study highlight the gaps in transportation management information and resources within LGs. These gaps were used to then identify opportunity areas that are low-cost and low-effort. The list of recommendations included in the previous section are not all-inclusive, but are intended to get LGs started with a strong base understanding and foundation of TAM. Although TAM is a simple and straightforward concept, there are many layers and complexities that are introduced as management systems grow. This guide is intended for local agencies specifically located within Georgia. The provided recommendations can be built upon as agency TAM programs evolve and develop.

Future Recommendations

The TAM LG shortcomings and opportunity areas should continue to be researched and investigated. Due to the limited scope and timeline of this research project, the number of survey participants were limiting. More outreach should be conducted to gather information from cities and counties in Georgia who did not respond to the survey. More information will help shape future policies and recommendations. Recommendations cannot be made without first understanding what the shortcomings of LGs may be. Additional in-person and phone based interviews would be helpful in digging deeper into the responses given by the LG survey participants. The survey questions were limiting and additional interviews would yield invaluable information.

Additional research into other TAM processes within other states could lend insight into techniques that have succeeded and failed. Furthermore, a more detailed and expansive set of guidelines should be created for LGs. The guide should include additional resources, contact info, and step-by-step information on how to start and maintain a TAM program.

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APPENDIX A

Transportation Infrastructure Asset Management in Georgia's Counties and Cities

Survey Flow

Block: GENERAL QUESTIONS (5 Questions)

Standard: Transportation AM Program (9 Questions)

Standard: Condition Assessment & Data Management (6 Questions)

Standard: PERFORMANCE MEASURES & Decision-Making (3 Questions)

Standard: FUNDING (6 Questions)

Standard: Rating of Current Status (6 Questions)

Page Break

Start of Block: GENERAL QUESTIONS**Q63 Contact Information**

- ☐ Name: (1) _____
- ☐ Email Address: (2) _____
- ☐ Phone Number: (3) _____
- ☐ Job Title: (4) _____
-

Q67 Please provide the name of the County, City, or Consolidated City-County agency you work for.

- ☐ County: (1) _____
- ☐ City: (2) _____
- ☐ Consolidated City-County: (3) _____
-

Q60 List your agency's divisions/departments that are involved in managing transportation infrastructure assets (i.e. Public Works, Facilities & Transportation Services, Parks and Recreation, GIS, etc.)

Q62 How many employees are involved in managing transportation infrastructure assets?

- ☐ 0-5 (1)
- ☐ 6-10 (2)
- ☐ 11-20 (3)
- ☐ 20+ (4)
-

14

Does your agency have an established GIS department or GISP employees?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Somewhat (3)
- ☐ Other: (4) _____

End of Block: GENERAL QUESTIONS

Start of Block: Transportation AM Program

Q53 Transportation Infrastructure Asset Management

8

AASHTO defines Transportation Asset Management as a strategic and systematic process of operating,

9 Please select all transportation assets your agency manages

- ☐ Roadway (1)
- ☐ Bridges (2)
- ☐ Signage (3)
- ☐ Sidewalks (4)
- ☐ Marking/Striping (5)
- ☐ Culverts (6)
- ☐ Guardrails (7)
- ☐ Other - Please specify: (8) _____

Display This Question:

If Please select all transportation assets your agency manages = Roadway

Or Please select all transportation assets your agency manages = Bridges

Q68 How many bridges and miles of roadway does your agency manage?

- _____ Bridges (1)
- _____ Roadway Paved - Asphalt Concrete (2)
- _____ Roadway Paved - Portland Cement Concrete (3)
- _____ Roadway Unpaved (4)

Display This Question:

*If AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... !=
No*

11 How long has your transportation asset management program been implemented?

- ☐ Less than a year (1)
- ☐ 1-5 years (2)
- ☐ 6-10 years (3)
- ☐ More than 10 years (4)

Display This Question:

If AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... =
Yes

Or AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... =
Somewhat

19 Select the software your agency uses for transportation asset management, if any:

- ☐ N/A (1)
- ☐ In-house Program (Specify) (2) _____
- ☐ GIS (3)
- ☐ MicroPAVER (4)
- ☐ COPACES (5)
- ☐ StreetSaver (6)
- ☐ PAVER (7)
- ☐ AgileAssets Sign Manager (8)
- ☐ Cityworks (9)
- ☐ PubWorks (10)
- ☐ AASHTOWare (Pontis previously) (11)
- ☐ Other (12) _____

Display This Question:

*If AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... !=
No*

23 What state or federal laws or initiatives impact your agency's transportation asset management practices? Click on each answer choice for more information on each item.

- ☐ Fixing American's Surface Transportation (FAST) Act (1)
- ☐ Governmental Accounting Standards Board (GASB) Statement 34 (2)
- ☐ Other (3) _____

Display This Question:

If AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... != No

And AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... != Not Sure

Q69 What is the defined goal(s) set by your agency for the Transportation Asset Management Program? (Example: Keep 80% or more of roadway in 'Fair' or better condition.)

End of Block: Transportation AM Program

Start of Block: Condition Assessment & Data Management

Q54 Condition Assessment & Data Management

Q71 Does your agency have an inventory of transportation infrastructure assets?

- ☐ Yes (1)
- ☐ Somewhat (2)
- ☐ No (3)
- ☐ Not sure (4)

Display This Question:

If Does your agency have an inventory of transportation infrastructure assets? != No

13 What type(s) of software does your agency use to manage transportation infrastructure? Select all that apply.

- ☐ Paper record management system (1)
 - ☐ GIS Mapping (2)
 - ☐ Computerized Databases (Excel) (3)
 - ☐ Cloud computing (4)
 - ☐ Mobile and web applications (5)
 - ☐ None (6)
 - ☐ Other - Please specify: (7) _____
-

18 How does your agency conduct condition assessments? Select all that apply.

- ☐ In-house (1)
 - ☐ Contracted - Please specify contractors used: (2)

 - ☐ Public input (3)
 - ☐ Other: (4) _____
-

12 Which best describes your agency's data collection methods? Click for more information

- ☐ Manual (1)
- ☐ Semiautomated (2)
- ☐ Automated (3)
- ☐ Remote Collection (4)

Q64

	How often does your agency assess existing conditions for each asset?
Roadway (1)	▼N/A (1) ... More than 5 years (7)
Bridges (2)	▼N/A (1) ... More than 5 years (7)
Sidewalks (3)	▼N/A (1) ... More than 5 years (7)
Signage (4)	▼N/A (1) ... More than 5 years (7)
Culverts (5)	▼N/A (1) ... More than 5 years (7)
Other: (6)	▼N/A (1) ... More than 5 years (7)
Other: (7)	▼N/A (1) ... More than 5 years (7)
Other: (8)	▼N/A (1) ... More than 5 years (7)
Other: (9)	▼N/A (1) ... More than 5 years (7)
Other: (10)	▼N/A (1) ... More than 5 years (7)

Page Break

End of Block: Condition Assessment & Data Management

Start of Block: PERFORMANCE MEASURES & Decision-Making

21 Performance Measures & Decision Making

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Well defined performance measures are used to track project scope, schedule, and budget. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our planning and programming processes are periodically reviewed and updated. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Levels of service for system maintenance are well-defined. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We periodically distribute reports of performance measures for the public and stakeholders. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q57 Does your agency regularly (monthly, bi-annually, annually, etc.) publish and distribute reports of performance measures for the public and stakeholders?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Not Sure (3)
- ☐ Other: (4) _____

22 Which best describes your agency's method of maintenance or new construction project prioritization?

- ☐ Simple subjective ranking of projects based on judgement (1)
- ☐ Ranking based on parameters, such as level of service and condition (2)
- ☐ Ranking based on parameters with economic analysis (3)
- ☐ Optimization by mathematical programming model for year-by-year basis (4)
- ☐ Near-optimization using a marginal cost-effectiveness approach (5)
- ☐ Comprehensive optimization by mathematical programming model, taking into account the effects of "which," "what," and "when" (6)

End of Block: PERFORMANCE MEASURES & Decision-Making

Start of Block: FUNDING

24 Funding

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
--	--------------------------	--------------	-------------	-----------	-----------------------

We work with political leaders and other stakeholders to present funding options and consequences. (1)

☐ ☐ ☐ ☐ ☐

Programs are consistent with realistic projections of future revenues. (2)

☐ ☐ ☐ ☐ ☐

We have confidence in our construction cost estimates. (3)

☐ ☐ ☐ ☐ ☐

We have confidence in our cost estimates for maintenance activities and programs. (4)

☐ ☐ ☐ ☐ ☐

Display This Question:

If AASHTO defines Transportation Asset Management as a strategic and systematic process of operating... != No

25 Select the statement which best describes your agency's transportation asset management funding:

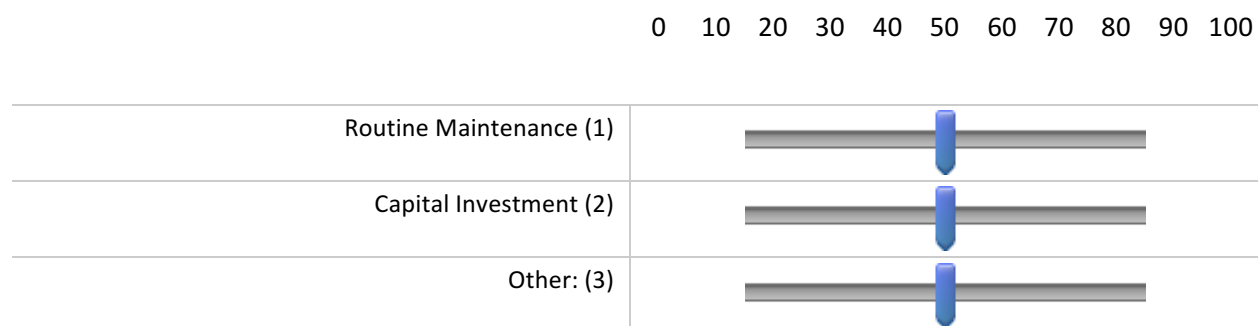
- ☐ Fixed amount each year (1)
- ☐ Funding amount is based on need (2)
- ☐ Funding is based on negotiations (3)
- ☐ Other: (4) _____

26 What is your agency's annual budget for Maintenance Rehabilitation and Reconstruction (MR&R)?

- ☐ Less than \$100,000 (1)
- ☐ \$100,000-\$199,999 (2)
- ☐ \$200,000-\$299,999 (3)
- ☐ \$300,000-\$399,999 (4)
- ☐ \$400,000-\$499,999 (5)
- ☐ \$500,000-\$999,999 (6)
- ☐ \$1,000,000-\$1,499,999 (7)
- ☐ \$1,500,000-\$1,999,999 (8)
- ☐ \$2,000,000-\$2,499,999 (9)
- ☐ \$2,500,000+ (10)

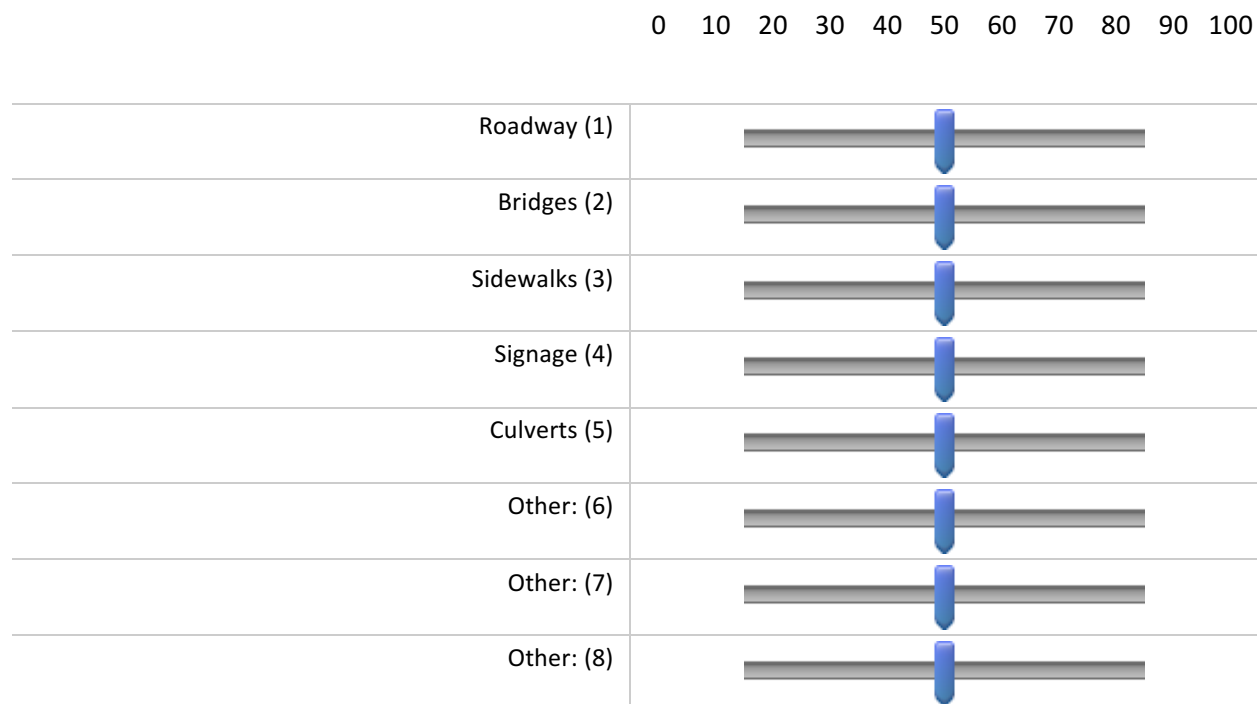
27 What percentage of your budget is allocated to each of the following:

Totaled percentages should sum to 100%.



28 How is your transportation funding allocated among transportation assets?

Totaled percentages should sum to 100%.



Q65

	LMIG Funding Amount Awarded	Percent Cost Match Provided by your Agency
Has your agency received Local Maintenance and Improvement Grant (LMIG) funding in the past year (2017)? If so, please indicate the amount of funding and your agency's cost match. (1)	▼Have not received LMIG funding (1) ... \$5,000,000+ (19)	▼0% (1) ... 100% (11)

End of Block: FUNDING

Start of Block: Rating of Current Status

15 Does your agency have access to data, information, and other resources from state and other local agencies? If so, which sources?

- ☐ Georgia Department of Transportation (1)
- ☐ Atlanta Regional Commission (2)
- ☐ Other Local Agencies, please specify: (3)
-
- ☐ Do not have access to information from other sources. (4)

16 How interested are you in the following:

	Not Interested (1)	Somewhat disinterested (2)	Neutral (3)	Somewhat interested (4)	Very Interested (5)
Increased support from GDOT (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased collaboration with neighboring local agencies (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased funding (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased educational programming (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shared purchasing of softwares and technologies (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

31 Have you received assistance from the Local Technical Assistance Program (LTAP) in the past?

- ☐ Yes (1)
- ☐ No (2)
- ☐ Not Sure (3)
- ☐ Other: (4) _____

Display This Question:

If Have you received assistance from the Local Technical Assistance Program (LTAP) in the past? = Yes

Q59 Please explain what assistance you have received from LTAP.

Q73 In your opinion, how do you rate the current transportation infrastructure asset management program practiced by your agency?

Rating (1)



Q74 In your opinion, what factors are hindering your agency from adopting a proper asset management program? Explain:

End of Block: Rating of Current Status
